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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/886,591	06/21/2001	Joshua L. Koslov	(DMSL)HA-84 (HAL-ID 179)	6329

26479 7590 07/12/2005

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EXAMINER	
AHN, SAM K	

ART UNIT	PAPER NUMBER
2637	

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

SM

Office Action Summary	Application No.	Applicant(s)	
	09/886,591	KOSLOV, JOSHUA L.	
	Examiner	Art Unit	
	Sam K. Ahn	2637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *amendment, 02/28/05*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-8,11-13 and 16-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-8,11-13 and 16-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06/21/01* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claims 2,6-8,11-13,16,18 and 19-26 is withdrawn in view of the newly discovered reference(s) to Norrell and Shiue. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 19,20 and 23-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Norrell et al. USP 6,034,993 (Norrell).

Regarding claim 19, Norrell discloses a method of using a filter having a plurality of tap weights to reduce an effect of phase jitter on a block of data representing at least one transmitted symbol, the method comprising the steps of (see Fig.4): operating said filter (64) to filter said block of samples (input to the filter) to produce a filtered block of data (72); determining a signal error (82) from the filtered block of data; updating at least one of said plurality of tap weights in said filter as a function of the determined signal error estimate (vNOMk, vERRi, note

col.7,line 61 – col.8, line 8 and lines 30-39) made from the filtered block of data output (72). Norrell further teaches repeating the steps above (see Fig.5) until a filter updating stop criterion is satisfied (wherein the mean zero is compared with zero, note col.9, lines 12-17).

Regarding claim 20, Norrell teaches all subject matter claimed, as applied to claim 19. Norrell further teaches supplying the filtered block of data output by said filter when said filter updating criterion is satisfied to subsequent receiver circuitry (70 in Fig.3, note col.8, lines 37-39 after determining that step 170 in Fig.5 is valid of having the updating criterion met).

Regarding claims 23 and 24, Norrell teaches all subject matter claimed, as applied to claim 19. Norrell further teaches wherein said step of determining a signal error includes generating a decision directed error value (vNOMk) and a non-decision directed error value (vERRi, note col.7,line 61 – col.8, line 8 and lines 30-39).

Regarding claim 25, Norrell teaches all subject matter claimed, as applied to claim 19. Norrell further teaches prior to performing step i, performing a channel compensation operation (60,62 in Fig.3) on said block of data.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 21,22 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Norrell et al. USP 6,034,993 (Norrell).

Regarding claims 21 and 22, Norrell teaches all subject matter claimed, as applied to claim 19. Norrell further teaches the updating stop criterion, as explained above. Although Norrell does not explicitly teach wherein the updating stop criterion is the completion of a fixed number of filtering operation, it would have been obvious to one skilled in the art at the time of the invention to implement of having the updating stop criterion as the completion of a fixed number of filtering operation for the purpose of preventing an infinite amount of loop to update the filter tap weights. Thus it is desirable to design a system of having a loop for a finite amount in order to further process incoming signals. It would be undesirable for any system to continue updating the filter tap weights when the signal error does not improve, in other words, the mean zero of Norrell in step 170 in Fig.5 continues to be a large number.

Regarding claim 26, Norrell teaches all subject matter claimed, as applied to claim 25. Norrell further teaches a single channel compensation operation and

performing step i, ii and iii multiple times, as explained previously. Although Norrell does not explicitly teach performing the block of data in a first time period of time, and step i, ii, and iii are performed multiple times in a time period which is equal to or shorter than the first time period, it would have been obvious to one skilled in the art at the time of the invention to implement with shorter period of time for the processing of step i, ii and iii for the purpose of expediting the updating filter tap weights and thus prevent from delaying the processing of incoming signal received. This is not novel as any system would design as such to synchronize the system having a stable flow of signal.

4. Claims 2-7 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al., USP 6,452,987 B1 (Larsson, cited previously) in view of Shiue et al. USP 6,816,548 B1 (Shiue).

Regarding claim 2, Larsson teaches an apparatus for processing a block of data representing at least one symbol, the apparatus (see Fig.8) comprising a jitter compensation filter (510, note col.7, lines 43-50 also shown as 610,615,620,625 in Fig.9, note col.8, lines 20-24) for performing a filtering operation on said block of data to generate a filtered block of data, the jitter compensation filter having an update input (feedback from 530) for receiving a filter coefficient update signal (output of 530, phase error); and an error calculation module (530) coupled to the update input of the jitter compensation filter, the error compensation module (530) generating the filter coefficient update signal from at least one signal error

estimate (equation 16) made from the filtered block of data output (y_n, $\hat{y}_n$, $\hat{a}_n$, b_n) by the jitter compensation filter.

However, Larsson does not teach a control circuit coupled to said error calculation module for determining as a function of said at least one signal error estimate, when to output said filtered block of data.

Shiue teaches a control circuit (66 coupled to 26 in Fig.2) coupled to an error calculation module (21) for determining as a function of said at least one signal error estimate (error from 21) when to output a filtered block of data (output of 20,30, thus controlling when to output the filtered block of data). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify the system of Larsson by incorporating the control circuit of Shiue by outputting the phase error (530 of Larsson) to the input of the control circuit (66 of Shiue) for the purpose of determining the phase error of the system and providing a pre and post-cursor taps as disclosed in the figure.

Regarding claim 3, Larsson in view of Shiue teach all subject matter claimed, as applied to claim 2. Larsson further teaches a channel compensation circuit (605,655 in Fig.9) for receiving said block of data and performing a channel compensation operation on at least a portion of said block of data prior to the block of data being processed by said jitter compensation filter (610,615,620,625 and note col.7, lines 43-53).

Regarding claim 4, Larsson in view of Shiue teach all subject matter claimed, as applied to claim 2. Larsson further teaches wherein said block of data represents a plurality of symbols, the apparatus further comprising a demodulator circuitry (DMT demodulator, 495 in Fig.12) coupled to an output of the jitter compensation filter (610,615,620,625).

Regarding claim 5, Larsson in view of Shiue teach all subject matter claimed, as applied to claim 2. Larsson further teaches wherein the error calculation module (650) includes means for generating a decision directed error value or error-driven algorithm (note col.8, lines 10-12)

Regarding claims 6 and 7, Larsson teaches an apparatus for processing a block of data representing at least one symbol, the apparatus (see Fig.8) comprising a jitter compensation filter (510, note col.7, lines 43-50 also shown as 610,615,620,625 in Fig.9, note col.8, lines 20-24) for performing a filtering operation on said block of data to generate a filtered block of data, the jitter compensation filter having an update input (feedback from 530) for receiving a filter coefficient update signal (output of 530, phase error); and an error calculation module (530) coupled to the update input of the jitter compensation module coupled to the update input of the jitter compensation filter, the error compensation module generating the filter coefficient update signal from at least

one signal error estimate (equation 16) made from the filtered block of data output (y_n, $\hat{y}_n$, $\hat{a}_n$, b_n) by the jitter compensation filter.

Although Larsson teaches the error calculation module generating an error value, Larsson does not explicitly teach wherein the error calculation module includes means for generating a decision directed error value and means for generating a pilot directed error value and a selection device for selecting one of the decision directed error value and the pilot directed error value to be output.

Shiue teaches error calculation module (see 20,21,24,25,26,28,30,40 in Fig.1) includes means for generating a decision directed error value (slice Error) and means for generating a pilot (or non-decision) directed error value (training Error) and a selection device (28) for selecting one of the decision directed error value and the pilot directed error value to be output (note col.5, lines 11-34).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Shiue in the error calculation module of Larsson for the purpose of having different modes of operation (training mode and decision-directed operating mode) wherein the training mode initiates prior to the decision-directed operating mode, thus achieve higher signal to noise ratio (note col.2, lines 2-13).

Regarding claim 16, Larsson discloses an apparatus for processing a block of data representing at least one symbol, the apparatus (see Fig.8) comprising a

a channel compensation circuit (605,655 in Fig.9) for receiving said block of data and performing a channel compensation operation on at least a portion of said block of data prior to the block of data being processed by said jitter compensation filter (610,615,620,625 and note col.7, lines 43-53); and jitter compensation filter (510, note col.7, lines 43-50 also shown as 610,615,620,625 in Fig.9, note col.8, lines 20-24) for performing a filtering operation on said block of data to generate a filtered block of data, the jitter compensation filter having an update input (feedback from 530) for receiving a filter coefficient update signal (output of 530, phase error).

However, Larsson does not teach a control circuit for determining when the output the jitter compensation filter should be used as the output of the jitter compensation module.

Shiue teaches a control circuit (66 coupled to 26 in Fig.2) coupled to an error calculation module (21) for determining as a function of said at least one signal error estimate (error from 21) when to output a filtered block of data (output of 20,30, thus controlling when to output the filtered block of data). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify the system of Larsson by incorporating the control circuit of Shiue by outputting the phase error (530 of Larsson) to the input of the control circuit (66 of Shiue) for the purpose of determining the phase error of the system and providing a pre and post-cursor taps as disclosed in the figure.

Regarding claim 17, Larsson in view of Shiue teach all subject matter claimed, as applied to claim 16. Larsson further teaches a signal error estimation circuit (530) for generating from the output of the jitter compensation filter a measure of a symbol error.

Regarding claim 18, Larsson teaches a system for processing a multi-tone signal, the system (see Fig.9) including a channel compensation module (605,655 in Fig.9) for performing a channel compensation operation on said multi-tone signal (r_n), and a jitter compensation filter (510, note col.7, lines 43-50 also shown as 610,615,620,625 in Fig.9, note col.8, lines 20-24) for performing a filtering operation on said block of data to generate a filtered block of data, the jitter compensation filter having an update input (feedback from 530) for receiving a filter coefficient update signal (output of 530, phase error); and an error calculation module (530) coupled to the update input of the jitter compensation module coupled to the update input of the jitter compensation filter, the error compensation module generating the filter coefficient update signal from at least one signal error estimate (equation 16) made from the filtered block of data output (y_n, $\hat{y}_n$, $\hat{a}_n$, b_n) by the jitter compensation filter.
However, Larsson does not teach means for resetting the jitter compensation filter tap weights to an initial set of values in response to the control circuit determining that the output of the jitter compensation filter should be used as the output of the jitter compensation filter.

Shiue teaches wherein a jitter compensation filter (20,30 in Fig.1) further includes means for resetting filter coefficient values to a set of initial values (note col.5, line 62 – col.6, line 1) in response to a reset signal (control signal) generated by an output control device (15,66).

Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of resetting the jitter compensation filter of Larsson for the purpose of preventing any undesired changes occurring prior to initialization of the equalization process, as taught by Shiue (note col.5,line 65 – col.6, line 1).

5. Claims 8,11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al., USP 6,452,987 B1 (Larsson, cited previously) in view of Shiue et al. USP 6,816,548 B1 (Shiue) and Chen et al., USP 6,246,717 B1 (Chen, cited previously).

Regarding claim 8, Larsson in view of Shiue teach all subject matter claimed, as applied to claim 7. However, Larsson in view of Shiue do not teach having an input buffer for storing said block of data.

Chen teaches a receiver having a memory (20 in Fig.4) for storing the incoming signal and further removing phase jitter or error (54,60,62,64,66). (note col.7, lines 4-56) Chen teaches testing of incoming signal, and thus provides the memory wherein the stored signal may be retrieved as needed and required.

Therefore, it would have been obvious to one skilled in the art at the time of the

invention to modify Larsson's teaching by inserting the memory of Chen prior to the FFT (in Fig.8,9) and store the incoming signal for the purpose of processing the signal as frequently as needed, and thus would process the signal including the processing of function performed by the jitter compensation filter.

Regarding claim 11, Larsson discloses an apparatus for processing a block of data representing at least one symbol, the apparatus (see Fig.8) comprising a jitter compensation filter (510, note col.7, lines 43-50 also shown as 610,615,620,625 in Fig.9, note col.8, lines 20-24) for performing a filtering operation on said block of data to generate a filtered block of data, the jitter compensation filter having an update input (feedback from 530) for receiving a filter coefficient update signal (output of 530, phase error); and an error calculation module (530) coupled to the update input of the jitter compensation module coupled to the update input of the jitter compensation filter, the error compensation module generating the filter coefficient update signal from at least one signal error estimate (equation 16) made from the filtered block of data output (y_n, $\hat{y}_n$, $\hat{a}_n$, b_n) by the jitter compensation filter.
However, Larsson does not teach a control circuit coupled to said error calculation module for determining as a function of said at least one signal error estimate, when to output said filtered block of data.
Shiue teaches a control circuit (66 coupled to 26 in Fig.2) coupled to an error calculation module (21) for determining as a function of said at least one signal

error estimate (error from 21) when to output a filtered block of data (output of 20,30, thus controlling when to output the filtered block of data). Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify the system of Larsson by incorporating the control circuit of Shiue by outputting the phase error (530 of Larsson) to the input of the control circuit (66 of Shiue) for the purpose of determining the phase error of the system and providing a pre and post-cursor taps as disclosed in the figure.

However, Larsson in view of Shiue do not teach having an input buffer for storing said block of data.

Chen teaches a receiver having a memory (20 in Fig.4) for storing the incoming signal and further removing phase jitter or error (54,60,62,64,66). (note col.7, lines 4-56) Chen teaches testing of incoming signal, and thus provides the memory wherein the stored signal may be retrieved as needed and required. Therefore, it would have been obvious to one skilled in the art at the time of the invention to modify Larsson's teaching by inserting the memory of Chen prior to the FFT (in Fig.8,9) and store the incoming signal for the purpose of processing the signal as frequently as needed, and thus would process the signal including the processing of function performed by the jitter compensation filter.

Regarding claim 13, Larsson in view of Shiue and Chen teach all subject matter claimed, as applied to claim 11. As explained above, Shiue teaches the further limitations recited regarding the output control device. Shiue further teaches

wherein a jitter compensation filter (20,30 in Fig.1) further includes means for resetting filter coefficient values to a set of initial values (note col.5, line 62 – col.6, line 1) in response to a reset signal (control signal) generated by an output control device (15,66).

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al., USP 6,452,987 B1 (Larsson, cited previously) in view of Shiue et al. USP 6,816,548 B1 (Shiue) and Chen et al., USP 6,246,717 B1 (Chen, cited previously) and in further view of Norrell et al. USP 6,034,993 (Norrell).

Regarding claim 12, Larsson in view of Shiue and Chen teach all subject matter claimed, as applied to claim 11. However, Larsson in view of Shiue and Chen does not explicitly teach means for determining when said block of data has been filtered a fixed number of times by the jitter compensation filter.

Norrell teaches updating stop criterion, as explained above. Although Norrell does not explicitly teach wherein the updating stop criterion is the completion of a fixed number of filtering operation, it would have been obvious to one skilled in the art at the time of the invention to implement of having the updating stop criterion is the completion of a fixed number of filtering operation for the purpose of preventing an infinite amount of loop to update the filter tap weights. Thus it is desirable to design a system of having a loop for a finite amount in order to further process incoming signals. It would be undesirable for any system to continue updating the filter tap weights when the signal error does not improve, in

other words, the mean zero of Norrell in step 170 in Fig.5 continues to be a large number.

Thus, it would have been obvious to one skilled in the art at the time of the invention to incorporate the obviousness teaching of Norrell in the system of Larsson for the purpose of preventing an infinite amount of loop to update the filter tap weights.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Lai et al. USP 6,570,917 B1 teach updating of the filter tap weights in the equalizer training.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Ahn whose telephone number is (571) 272-3044. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sam K. Ahn
7/7/05

TEMESGHEN GHEBRETINSAE
PRIMARY EXAMINER